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Center For Reproduction Of Endangered Species

1989 Summer Report

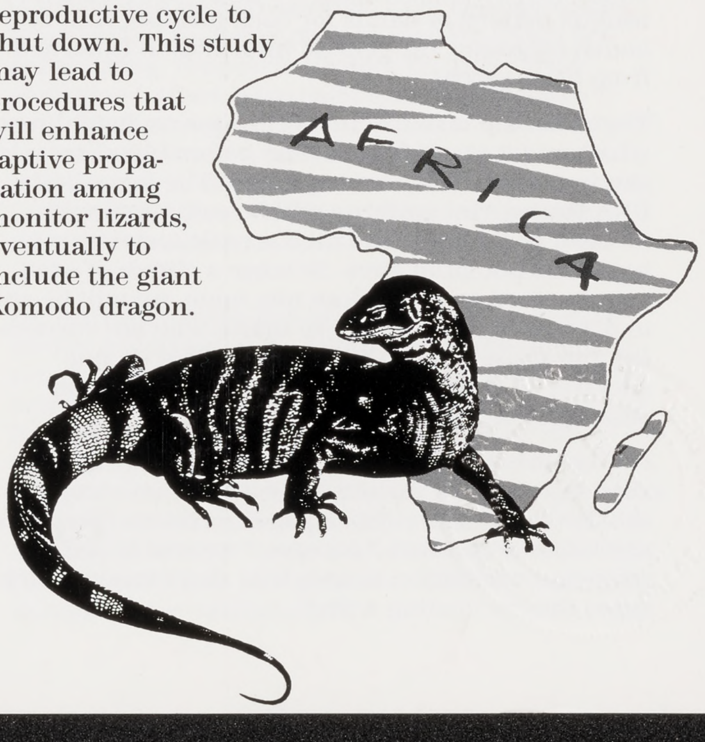
Editor: Judy Kinsell

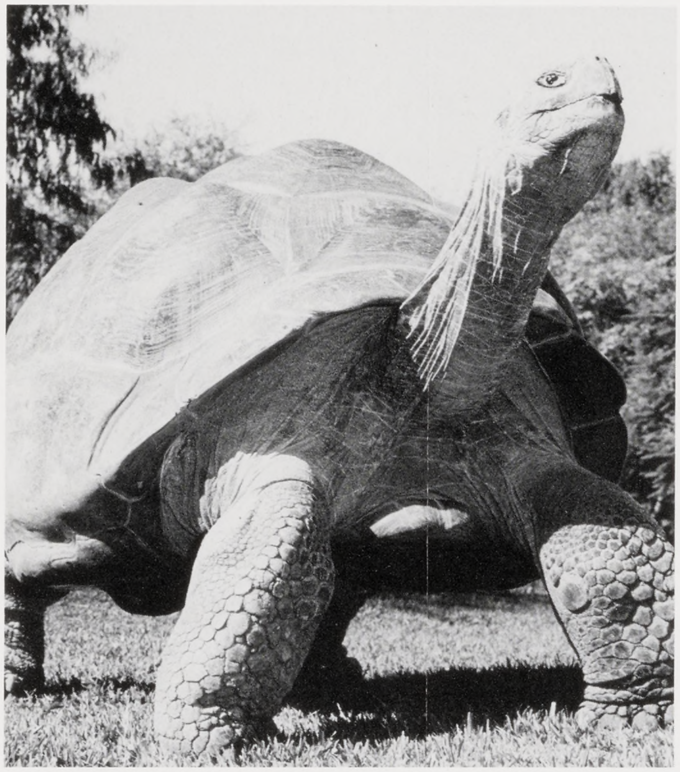
• COMPARATIVE PHYSIOLOGY Monitors are a family of carnivorous lizards ranging in length from several inches to 10 feet. Virtually every species of monitor is endangered, and none have reproduced well in a captive situation. The problem may be attributed to female monitor lizards, who rarely come into estrus when kept in captivity. CRES comparative physiologist Dr. John Phillips plans to study wild populations of monitors in an attempt to improve reproduction among their captive counterparts.

A generous grant from Mrs. Paquita Machris will enable Dr. Phillips to study monitors in Etosha National Park in Namibia, Africa for 18 months. There, he will track white-throated savannah monitors—a relatively common subspecies that reaches up to seven feet in length. Because Etosha's terrain is flat, observing the animals will be quite easy compared to monitoring species from tropical habitats.

"Working out of a mobile laboratory we'll be able to track individual lizards with radiocollars," said Dr. Phillips. "From time to time we'll take blood samples and determine if and when females come into heat. By watching the courtship behavior of males we'll be able to determine how territories are maintained and how the males and females behave when reproductive season approaches."

Research from the study in Namibia will be compared to data on captive monitors in San Diego. The results should point to what causes the female reproductive cycle to shut down. This study may lead to procedures that will enhance captive propagation among monitor lizards, eventually to include the giant Komodo dragon.





• GENETICS

CRES geneticist Dr. Oliver Ryder is spearheading an effort to obtain DNA fingerprints from the San Diego Zoo's collection of Galapagos tortoises. Dr. Ryder's objectives are to determine the paternity of giant tortoises, and to ascertain to which of 13 races the animals belong. The information that is brought to light will help preserve the gene pool for this endangered species.

In the initial investigation, scientists took blood samples from adult tortoises and applied the DNA fingerprinting technique to five random individuals. The resulting "fingerprints" reveal a unique pattern of bands for each tortoise. Half the bands represent the genetic information inherited from each parent.

The next step is to use the technique on hatchlings, which must reach football size before blood samples can be taken. Dr. Ryder explains, "The juveniles' DNA fingerprint patterns will be compared with those of their dams and all the male tortoises who represent potential sires. Because a clutch of eggs may be sired by more than one male, we will be able to determine not only those males who are successful, but those who father embryos that do not survive. That will give us valuable information about genetic incompatibility."

Dr. Ryder is hopeful that DNA fingerprinting will shed light on the various subspecies that compose the Zoo's collection of Galapagos tortoises. "Once we sort out our tortoises," he says, "we will be able to make a contribution to zoos that don't know which types they're dealing with."

• ENDOCRINOLOGY

Habitat destruction and rampant poaching for ivory have reduced wild populations of Asian elephants to fewer than 35,000. To help ensure a future for the species, captive breeding efforts have been stepped up at 13 North American zoos and parks. Of 56 total births, 27 have taken place in this decade.

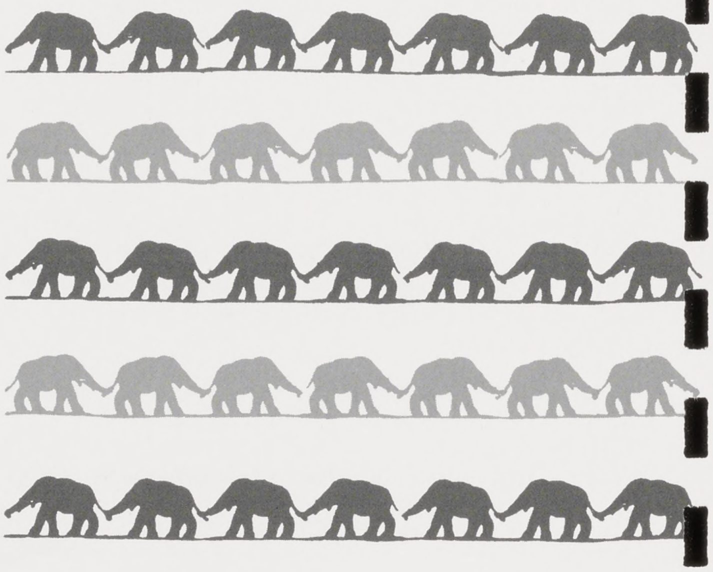
CRES endocrine specialist Nancy Czekala-Gruber is studying female Asian elephant reproductive cycles to predict ovulation for timed matings. Says Ms. Czekala-Gruber, "In most mammals, you can look at estrogen in the blood to get an indication of how the ovary is progressing toward ovulation. But in elephants, serum estrogen levels are fairly flat. The only way to monitor the cycle is to look at serum progesterone."

"In the preliminary study, we took weekly blood samples from each cow at the Wild Animal Park and charted progesterone levels. Then we looked at the serum progesterone patterns, which can tell us within two weeks when ovulation will take place. We put the cow in with the male at that time."

Breeding elephants is by nature a lengthy process. Hormone patterns indicate that an elephant's cycle is 3½ to 4 months long, so females ovulate only three times each year. Gestation is estimated to be between 21 and 22 months.

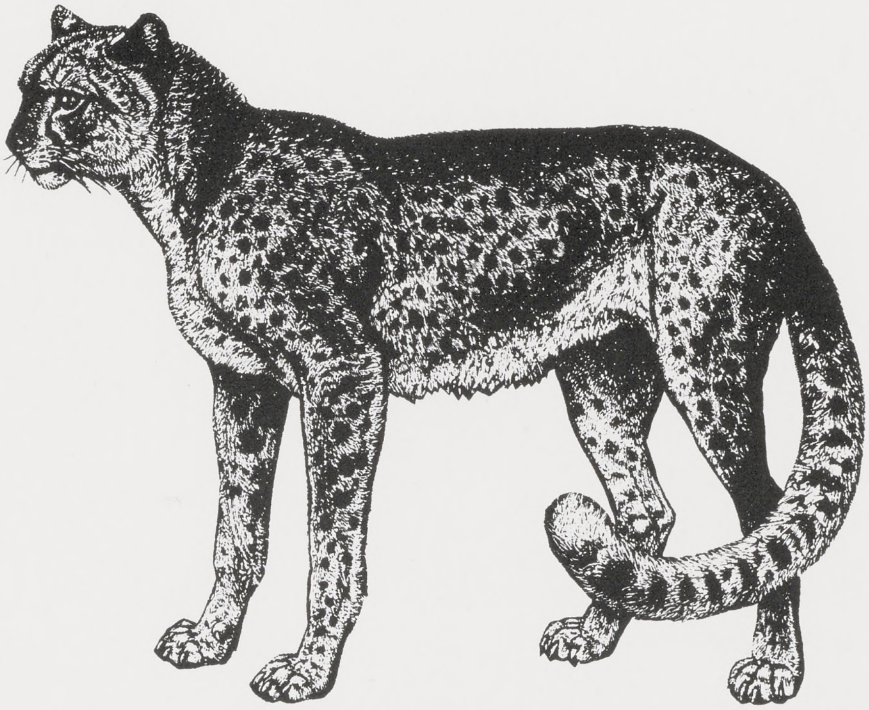
Still, the success of the CRES procedure speaks for itself. At this writing, three Asian elephants at the Wild Animal Park are pregnant. If all goes well, they will be the first successful Asian elephant births at the Park. (One calf was stillborn in 1987.)

As for the future of elephant endocrine studies, CRES scientists continue to search for hormones in the animals' urine that could one day be used to predict the exact day of ovulation. Finding such a hormone would give scientists a more precise and efficient method of monitoring the reproductive cycles of these magnificent creatures.



Led by Dr. Werner Heuschele, CRES scientists are in a race against time to save endangered animal species. Their accomplishments are shared with zoos and wildlife organizations worldwide for the benefit of those who join us in our commitment.

For information on how you can help CRES, please call Amy Parrott at (619) 231-1515, extension 4249.



• CYTOGENETICS

The CRES cytogenetics division is currently focusing on chromosome analysis of several South American primates. Cytogeneticist Arlene Kumamoto and her assistants are investigating the chromosomal differences within populations of titi monkeys, spider monkeys and other new world monkeys in order to define existing species and subspecies. The goal of this effort is to provide information that will allow zoos to manage their South American primate collections in the most appropriate manner.

Relentless destruction of South American rain forests has made it increasingly important for zoos to breed primates native to that region in captivity. Yet traditionally, taxonomists have grouped or identified species with little or no regard to genotype, or genetic makeup. Says Ms. Kumamoto, "It has been found in the owl monkey for example, that many different genotypes exist within the same species of animals coming from different habitat locations."

Mixing animals of different genotypes in breeding groups can lead to a number of serious complications. Reproductive problems such as reduced fertility, increased spontaneous abortions and stillbirths may result, as well as hybrid sterility. These circumstances underscore the critical importance of bringing together genotypically similar animals in captive breeding situations.

CRES regularly receives shipments of cell samples for cytogenetic analysis from institutions around the world. Insights into the genetic makeup of captive populations have proven useful not only to our own Zoo and Wild Animal Park collections, but to wildlife concerns worldwide.

• REPRODUCTIVE PHYSIOLOGY

CRES reproductive physiologist Dr. Barbara Durrant and her assistants reached an important goal when frozen and thawed cheetah semen penetrated a hamster egg. "Hamsters, unlike any other mammal, produce ova that can be penetrated by sperm of other species," said Dr. Durrant. "The 'hamster ova penetration assay' is used extensively to assess the fertilizing capacity of human sperm and has been modified at CRES for analysis of sperm from a variety of endangered species." The CRES scientists proved it is possible to cryopreserve cheetah semen without losing its fertilizing ability. The breakthrough brings all zoos closer to the day when frozen semen can be transported between zoos for use in artificial insemination.

Because semen samples vary from one male to another, and no two samples have the exact same biochemical makeup, the penetration study is a painstaking, long-term project. Of many trials performed, there have been four penetrations to date. Dr. Durrant explains, "With no baseline information whatsoever, we have to discover how to prepare sperm for penetration. We have to recreate in the lab all those biochemical processes that would normally occur in the reproductive tract of the female."

Dr. Durrant's team has been involved in cheetah semen collection since 1980, and in cryopreservation studies since 1985. A tremendous amount of behavioral data has also been gathered at CRES to begin to form a complete reproductive profile of the cheetah. Dr. Durrant now works closely with behaviorists, veterinarians and keepers on an intensive propagation effort for this endangered species. Says Dr. Durrant, "I think we feel a time crunch to get these animals to reproduce routinely, either by themselves or artificially."

● **BEHAVIOR** A new primate breeding corral at the Wild Animal Park is providing a relaxed, naturalistic environment for the Zoo's collection of drills, a critically endangered species of forest baboons native to West Africa. The four drills were removed from exhibit because of their extreme sensitivity to public contact.

CRES behaviorist Dr. Donald Lindburg hopes the half-acre corral will give a male and two breeding age females the privacy and security they need to reproduce successfully. With only 18 drills remaining in captivity in the United States, and the wild population disappearing, the situation is critical. "As far as captive populations are concerned," says Dr. Lindburg, "the drill is in worse shape than the California condor. The condors are breeding but the drills are not."

Dr. Lindburg and his team plan to collect more behavioral information on the drills than was possible in the Zoo's monkey yard. "We are monitoring their adjustment to the new environment, and observing to see if there is any attempt at natural mating. In the monkey yard, keepers had indirect evidence of mating, but they have not been able to follow this. We will follow the cycles visually to see if and when any kind of mating activity takes place. That will be the starting point."

According to Dr. Lindburg, the acute sensitivity of drills is unusual in comparison with the tough, aggressive nature of savannah baboons. "We really don't know a lot about drills," he says. "We may be in for some surprises as we begin to focus attention on their behavior."

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